FIG. 1

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"Semiconductor Device Test Apparatus and
Method"
Inventors: Kazuyoshi Okawa, et al.
Contact: Gallagher & Lathrop (415) 989-8080
Docket: NAA243

< MRA PROGRAM 32AP >

< USER ANALYSIS PROGRAM 32BP >

32A1

| WAIT FOR TRIGGER FROM TP |
| OBTAIN TEST RESULT DATA |
| INITIALIZE VARIABLES |

32N1

32A2

| LINE FAIL REPAIR |

32N2

32A3

| BIT FAIL REPAIR |

32N3

32A4

YES — IS THERE ANOTHER SOLUTION ?

NO

32N4

32A5

| GENERATE RESULT |

32N5

32B1
| FUNCTION TO BE EXECUTED WHEN VARIABLES ARE INITIALIZED |

32B21
| FUNCTION TO BE EXECUTED AFTER COMPLETION OF LINE FAIL REPAIR |

32B3
| FUNCTION TO BE EXECUTED AFTER COMPLETION OF BIT FAIL REPAIR |

32B4
| FUNCTION TO BE EXECUTED BEFORE GENERATION OF RESULT |

32B5
| FUNCTION TO BE EXECUTED AFTER GENERATION OF RESULT |

32A

32B

| DATA STORAGE | 32D

| ANALYSIS CONTROL PART | 32C

32 GENERAL-PURPOSE REPAIR ANALYSIS PART

FIG. 2

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32F

MRA PUBLIC
FUNCTION

32AP

MRA PROGRAM

32BP

USER
FUNCTIONS
32B1-32B5
(C LANGUAGE)

DATA CHECK
FUNCTION
PORTION

32FC

FIG. 3

MRA PUBLIC
FUNCTION : "Mra" + CLASS NAME + VERB + OBJECT

Mra

Result

Get

Total Bin
Repair List

Search Bit Count
Split Bit Count

Address

Fail

Address

Repair

Set

SpareLineNo

32C1   32C2   32C3   32C4

FIG. 4

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FIG. 5

```
1   #include <MraLib. h>

2   static   MraRepairId_t    RepairIdList[MraSPARELINE_COUNT_MAX];
3   static   int        compare( const void *a,  const void *b)
4   {
5     const MraRepairId_t    *A = a, *B = b;
6     int  blockA, blockB;
7     uint32_t        adrsA, adrsB;
8     MraRepairGetAddress( *A, &blockA, &adrsA) ;
9     MraRepairGetAddress( *B, &blockB, &adrsB) ;
10    if (   adrsA  < adrsB)        return   -1 ;
11    if (   adrsA  > adrsB)        return   1 ;
12    return       0 ;
13  }

14  static  MraStatus_t addressCheckRow(int blockGroupNo, MraDir_t dir)
15  {
16    MraRepairId_t *repairId = RepairIdList ;
17    int        blockNo0, blockNo1 ;
18    uint32_t       address0, address1;
19    int i, count ;
20    count = MraBlockGroupGetRepairList ( blockGroupNo,  dir,
21                      repairId, MraSPARELINE_COUNT_MAX) ;
22    MraQsort( repairId,   count,   sizeof(MraRepairId_t) ,  compare) ;
23    for (i=0 ;  i<count-1;   i++) {
24      MraRepairGetAddress( repairId[ i   ],  &blockNo0,  &address0) ;
25      MraRepairGetAddress( repairId[ i+1],  &blockNo1,  &address1) ;
26      if ( address0 == address1) return MraNG ;
27    }
28    return MraOK ;
29  }

30  MraStatus_t   SampleRuleCheck1(void *clientdata)
31  {
32    int blockGroupNo ;
33    blockGroupNo = MraGetBlockGroupNo( ) ;
34    if ( addressCheckRow ( blockGroupNo,  MraDIR_ROW) ! = MraOK) return MraNG ;
35    return       MraOK ;
36  }

37  int       UserSetup ( void )
38  {
39    MraSetUserFunc("SAMPLE_RULE_CHECK1", MraPOINT_POST_REPAIR
      _LINEFAIL, SampleRuleCheck1,
40                  NULL ) ;
41    MraSetUserFunc("SAMPLE_RULE_CHECK1", MraPOINT_POST_REPAIR
      _BITFAIL, SampleRuleCheck1,
42                  NULL) ;
43    return    0 ;
44  }
```
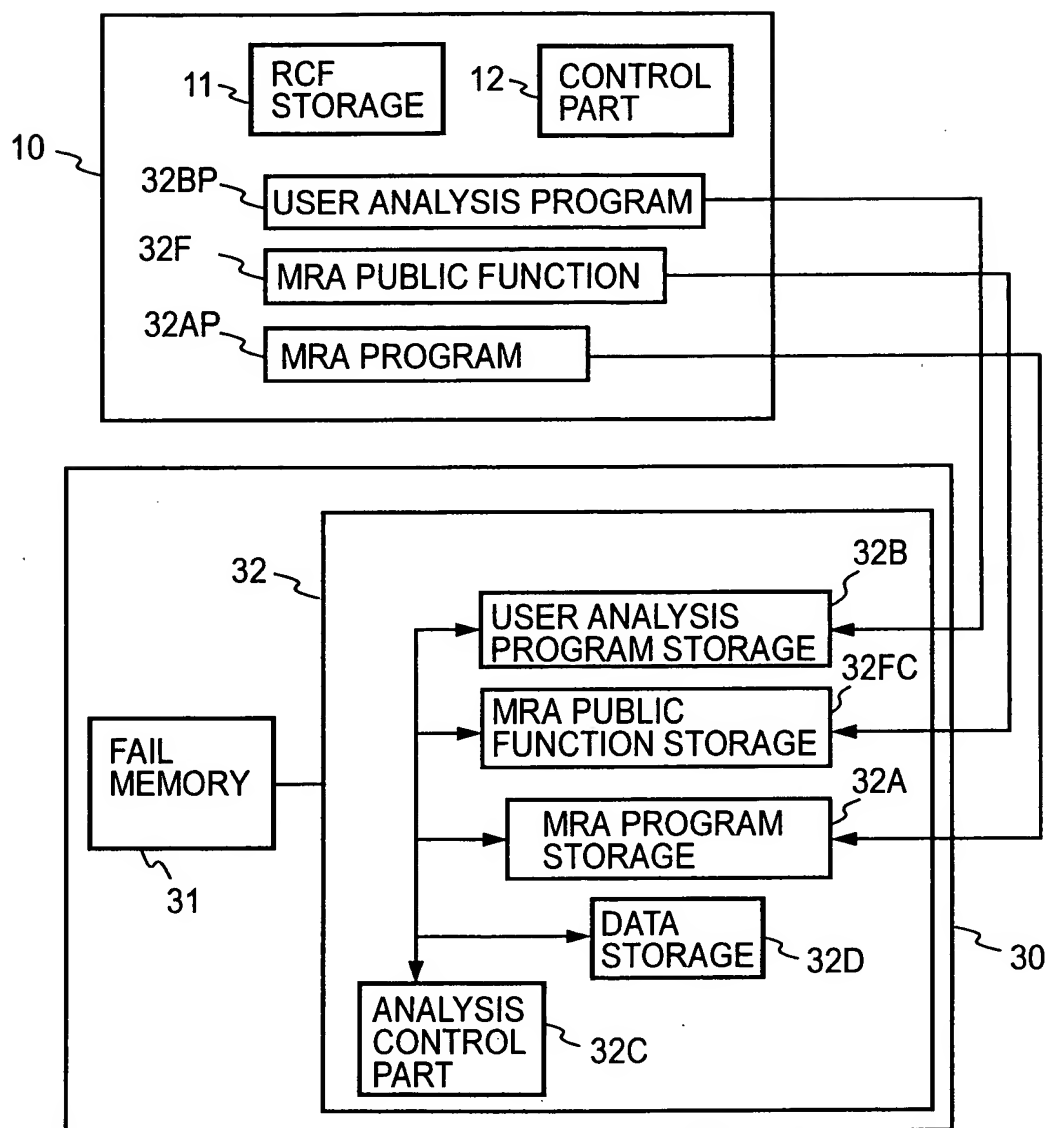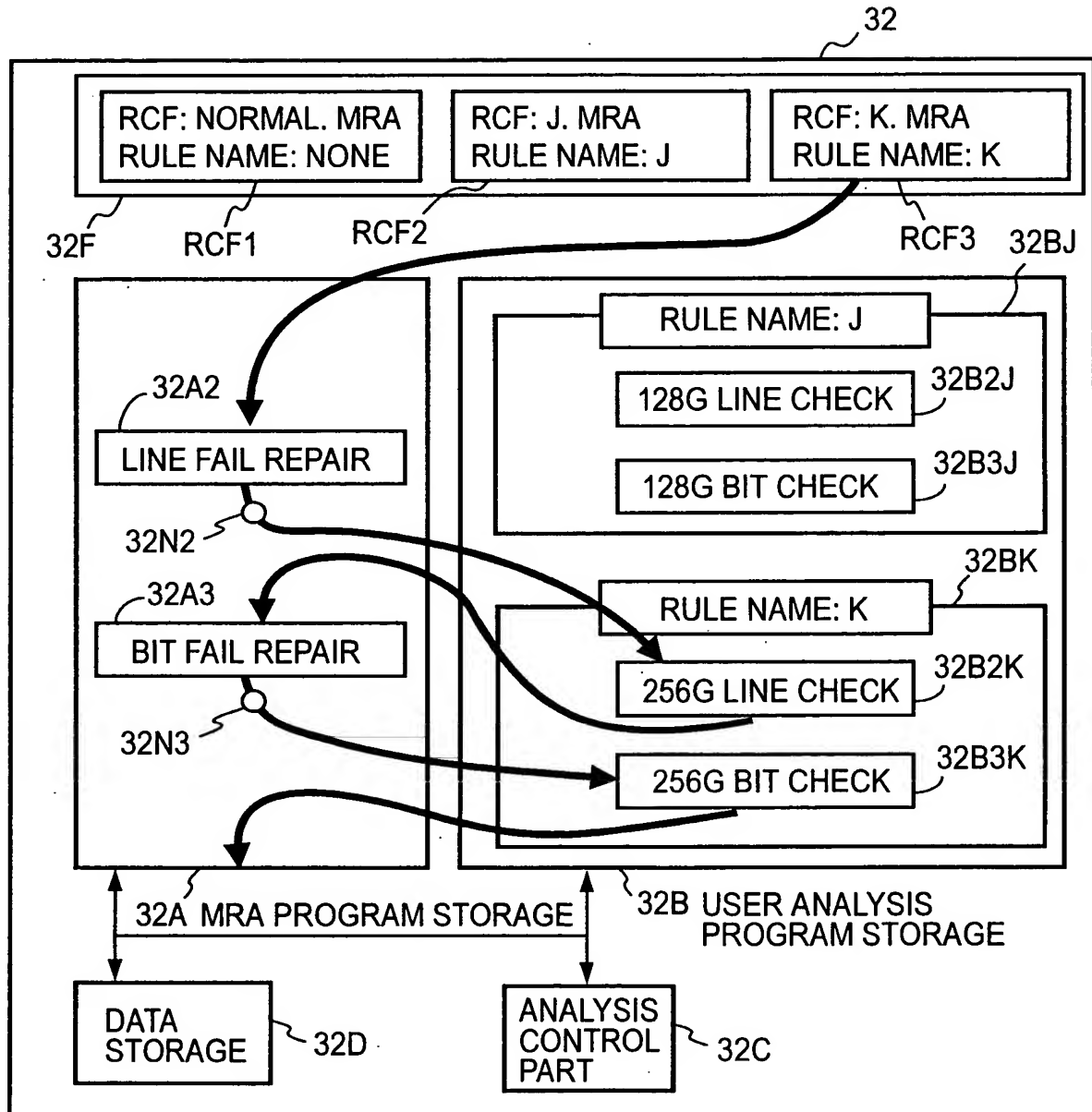
UF1

UF2
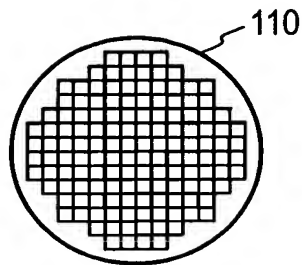
UF3

UF4

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FIG. 6

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FIG. 7

FIG. 8A

FIG. 8B

SPARE LINE

120 MEMORY BLOCK

FIG. 8C

SPARE LINE

120 MEMORY BLOCK

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FIG. 9

FIG. 10

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FIG. 11

FIG. 12

FIG. 13

S140

FUNCTION TEST

S141

EXECUTE MRA UNDER RESTRICTIONS OF CONDITIONS 1 AND 2

S142

TEMPORARILY STORE REPAIR SOLUTION

S143

ADJUST REPAIR SOLUTION WITH CONDITION 3

S144

REPAIR SOLUTION